

opposite semicircle. The position of the vessel at Greenwich mean noon of March 6 was latitude $41^{\circ} 19' N.$, longitude $57^{\circ} 51' W.$ —about 180 miles, therefore, to the westward of the *Pretoria*. The shifts of the wind during the advance of the storm were ENE., 10; NNW., 11; WNW., 10. The observer reports: "Continuous violent rain until 2 p. m. of the 6th; a tremendous sea running, causing the ship to labor fearfully; the wind blows at times with hurricane force; at 6 p. m. the sea was so very boisterous that the ship had no steerage way; both engines were accordingly stopt; at 3 a. m. of March 7, the storm had abated sufficiently to allow us to resume our course; lowest barometer, 733 millimeters (28.88 inches), at midnight".

The center of the storm moved northward across Cape Race during March 8, and conditions were thence undisturbed until March 11. Upon this date another depression appeared in the neighborhood of $39^{\circ} N.$, $65^{\circ} W.$, and, moving northeastward, was followed by northwesterly gales in the region to the southward of Nova Scotia. This was followed by a period of quiet weather which terminated on the 19th. Upon the last-named date a low moved eastward from the Great Lakes and on March 20 was central over the Bay of Fundy, the barometer at Eastport, Me., reading at 8 a. m. 28.66 inches. Southerly gales of force 10 and 11 swept the transatlantic routes from the American coast to the meridian of 60° west. The center of the depression did not at any time come within the region of observation at sea.

On March 24 an elongated trough of low pressure extended southeastward from Cape Race to a point situated in latitude $35^{\circ} N.$, longitude $40^{\circ} W.$ On the western slope of this trough northwesterly gales of force 8 to 9 prevailed, covering a belt

300 miles in width. On the eastern slope southerly and southeasterly winds of force 6 were the rule, rising to force 8 thruout a limited area at the southern extremity. As the day advanced the axis of this trough assumed a more easterly direction, the trough itself at the same time increasing in depth, with the result that thruout March 25 the transatlantic routes from the longitude of Cape Race to the meridian of $30^{\circ} W.$, were the scene of steady southwesterly and westerly gales of force 9 and 10.

On the 26th of the month a tropical depression made its appearance between Bermuda and Porto Rico, in which the *Epsom* (British S. S., Cox, Channel to Galveston, report by officer Williams) and the *Tampico* (British S. S., Westcott, Channel to New Orleans, report by officer Haworth) became involved on the 27th. According to the report of the former vessel the slow initial fall of the barometer which marks the approach of storms of this nature set in at noon of March 25. At 4 a. m. of the 26th, the barometer rose slightly and the wind became variable, finally settling in the northeast, while a heavy northwesterly swell at the same time made itself felt. The position of the vessel at Greenwich mean noon was latitude $33^{\circ} N.$, longitude $69^{\circ} W.$; wind NE., barometer 29.44 inches. Fifteen minutes later a squall of wind heralded the break of the threatening gale from the north. Fierce squalls of hurricane force were frequent and a very high and dangerous sea soon rose. The hurricane continued to rage thruout the day, the barometer meanwhile rising, altho very slowly. At Greenwich mean noon of the 27th the position of the *Epsom* was latitude $30^{\circ} 30' N.$, longitude $63^{\circ} 10' W.$, wind N., 12; barometer 29.71 inches, weather overcast and squally. At 1 p. m. the sky cleared and the wind and sea soon moderated.

THE WEATHER OF THE MONTH.

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PRESSURE.

The distribution of mean atmospheric pressure for March 1907, over the United States and Canada is graphically shown on Chart VI, and the average values and departures from the normal are shown for each station in Tables I and V.

During March, 1907, the distribution of the average pressure showed two well marked variations from the normal. Pressure averaged unusually low over all northwestern districts of the United States and Canada, and relatively high over all southern and eastern districts.

As a result of this reversal of pressure distribution, no high-pressure areas of any considerable magnitude moved southward from their usual source of origin over the Great Plains region east of the Canadian Rockies, and such cold waves as overspread the more northern districts were correspondingly lacking in severity.

On the other hand, the presence of unusually high pressure over the Gulf of California and adjacent territory and all southern and eastern districts forced the warm southerly winds of those latitudes far to the north of their usual limits.

Over the upper Missouri Valley and thence westward to the Pacific and northward over the Canadian Provinces the pressure was almost continuously below the average, while over southern California, Arizona, and New Mexico comparatively high pressure was the rule during most of the month.

Pressure also averaged considerably above the normal in all districts along the Gulf and Atlantic coasts. The entire region west of the Rocky Mountains, the Great Plains south of Nebraska, the lower Mississippi Valley, and the Gulf States were not within the direct influence of any considerable area of high pressure, having its origin in northern districts, during the month; on the other hand, no portion of the country was exempt from the influence of the numerous low areas which moved eastward from the Pacific.

TEMPERATURE.

The warm waves that overspread nearly all districts of the United States east of the Rocky Mountains from the 18th to 23d and from the 24th to 29th established new records at many points for both the highest monthly mean and the highest maximum temperatures ever recorded in March at the respective stations.

The abnormally warm weather during the above periods occurred in connection with marked depressions of the barometer in the central districts, but generally without the usual cloud formations and attended by little or no precipitation, which, with comparatively high pressure over the Gulf States and in the extreme Southwest, gave warm southerly winds and almost midsummer temperatures over the Great Plains, central valleys, and all eastern districts. Maximum temperatures far in excess of any previous March record, and in some sections higher than before recorded in any previous April or May, were recorded about the 23d, and again about the 29th.

The month as a whole was one of marked temperature excess over all portions of the United States, except the extreme eastern portion of Maine and over the Pacific coast districts.

Over practically all that portion of the United States from the Rocky Mountains eastward the average for the month exceeded the normal by more than 6° daily, and over the greater portion of the central Mississippi Valley region, Kansas, Oklahoma, and Texas the normal was exceeded by more than 10° daily.

Over the greater portion of the territory between the Rocky Mountains and the Mississippi Valley and south of Nebraska, the temperature has averaged continuously above the normal for the four months from December to March, inclusive. The average excess during that period over portions of Kansas, Oklahoma, Texas, Louisiana, and Arkansas, ranges from 7° to more than 10° daily.

West of the Sierras the month averaged somewhat colder than normal, the average deficiency in the Sacramento Valley ranging from 3° to 5° daily.

Maximum temperatures above 90° were recorded in the south Atlantic and east Gulf districts, over the districts between the Mississippi River and the Rocky Mountains and south of Nebraska and Iowa, and over the southern portions of New Mexico, Arizona, and California.

Temperatures below zero were confined to the northern districts of New England, central and northern New York, the upper Missouri Valley, and in the mountain districts of Wyoming and Colorado.

Freezing temperature did not penetrate farther south than to north-central Texas and the extreme northern portions of the Gulf States.

PRECIPITATION.

The deficiency in precipitation over portions of the South Atlantic and east Gulf States, and the Florida Peninsula, noted in the REVIEW for February, 1907, continued during March.

Over all the States of the cotton belt the precipitation was from 2 to 4 inches less than the average fall, and in portions of those States the amounts measured were the least on record.

Over the Florida Peninsula the accumulated deficiency from September, 1903, to March, 1907, inclusive, amounted to about 13 inches. Less than the average amounts of precipitation occurred over all districts along the Atlantic coast, in the districts between the Mississippi Valley and the Rocky Mountains, and over most of Washington and northwestern Oregon.

In the watershed of the Ohio River heavy precipitation occurred from the 12th to 14th, which, with the rapid melting of the snow on the ground, combined to produce one of the worst floods in the history of the streams of that section, a full account of which appears elsewhere in this issue.

Over all portions of the mountain and Plateau districts of the west and the Pacific coast from Washington southward, the precipitation was generally above the average. In the mountainous portions of California and generally over the State the month was one of the wettest on record. Rain or snow occurred in some portion of the State nearly every day of the month, and the daily and monthly amounts recorded at some of the elevated stations on the western flanks of the Sierras were phenomenal.

Monthly amounts from 30 to more than 45 inches were measured at numerous points, with daily falls of from 5 to as much as 8 inches.

The unusually heavy falls of rain and snow filled the rivers and streams of that State, and the stages at many places were the highest on record.

SNOWFALL.

The snowfall during March was generally light on the eastern slopes of the Rocky Mountains and thence eastward, except over the mountain portions of West Virginia, Maryland, and southern Pennsylvania, where considerable snow occurred about the 10th. On the western slopes of the Rocky Mountains, over the Plateau region, and on the elevated portions of California and Oregon the snowfall was generally above the average.

In the mountains of California the monthly amounts were exceptionally heavy, the total fall at some of the higher elevations amounting to as much as 25 feet. In the mountains of Idaho and in Montana west of the main range, and on the western slopes of the mountains of Wyoming and Colorado much snow occurred. The warm weather, with strong southerly winds, melted much from the lower elevations, but in the wooded districts and other protected localities much snow had accumulated.

Owing to the alternate thawing and freezing, together with the considerable rain that had fallen upon the snow, it had become thoroly packed, contained a large percentage of water

and was in excellent condition, supplemented by the generally well-saturated condition of the soil, to assure more than an average supply of water in the streams till late in the summer.

At the end of the month snow still covered the ground in the woods of northern New England and the Upper Peninsula of Michigan. From the Great Lakes westward the southern limit of snow receded during the month to the extreme northern portions of the States, where depths of a few inches still remained on the ground. Much snow still remained unmelted in the mountains west of the Continental Divide.

HUMIDITY AND SUNSHINE.

Over all interior districts east of the Rocky Mountains the percentage of relative humidity averaged considerably lower than the normal. On the immediate Gulf coast and the Florida Peninsula, despite the lack of precipitation, the amount of moisture in the atmosphere averaged considerably above the normal, owing to the influence of the prevailing moist southerly winds from the Gulf. In all districts west of the Rocky Mountains the relative humidity was unusually high.

Much bright sunny weather prevailed in all districts east of the Rocky Mountains, especially over the Great Plains, Mississippi Valley, and Gulf States, where the progress of the season averaged from two to four weeks in advance of the normal, both in the development of vegetation and in the opportunities offered for the prosecution of the usual seasonal operations.

On the Pacific slope, especially over California and Oregon, cold, rainy weather during most of the month retarded the development of vegetation, and delayed the prosecution of all outdoor occupations.

Average precipitation and departures from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		Inches.	Inches.
New England.....	12	2.42	67	-1.2	-3.3
Middle Atlantic.....	16	2.81	74	-1.0	-3.5
South Atlantic.....	10	1.57	36	-2.3	-7.4
Florida Peninsula*.....	8	0.29	9	-2.8	-7.5
East Gulf.....	11	2.04	35	-3.8	-6.3
West Gulf.....	10	1.83	57	-1.4	-4.0
Ohio Valley and Tennessee.....	13	4.82	112	+0.5	0.0
Lower Lake.....	10	2.84	112	+0.3	-0.1
Upper Lake.....	12	2.24	110	+0.2	-0.6
North Dakota*.....	9	0.85	89	-0.1	+0.3
Upper Mississippi Valley.....	15	2.23	100	0.0	+0.6
Missouri Valley.....	12	1.04	60	-0.7	+0.3
Northern Slope.....	9	0.54	64	-0.3	-0.2
Middle Slope.....	6	0.58	45	-0.7	-0.6
Southern Slope*.....	7	0.59	60	-0.4	-0.6
Southern Plateau*.....	12	1.49	167	+0.6	+1.2
Middle Plateau*.....	10	1.88	147	+0.6	+0.9
Northern Plateau*.....	12	1.80	120	+0.3	+0.8
North Pacific.....	7	3.45	66	-1.8	-4.2
Middle Pacific.....	8	8.00	200	+4.0	+4.9
South Pacific.....	4	3.57	165	+1.4	+3.0

* Regular Weather Bureau and selected cooperative stations.

In Canada.—Director Stupart says:

The precipitation was deficient thruout the greater portion of the Dominion, the exceptions to the prevailing conditions being a marked positive departure in the vicinities of Calgary and Prince Albert, a slight excess in portions of northwestern Manitoba, an excessive amount of snow in the neighborhood of White River, Ont., and a positive departure locally in the precipitation of about one inch in the Georgian Bay region and also in the extreme western portion of Quebec. In the Maritime Provinces, altho several heavy snowstorms occurred, the precipitation was everywhere below the usual amount. The chief negative departures reported were New Westminster, 3.6 inches; Kingston, 1.7 inches; Yarmouth, 2.6 inches; Halifax and St. John, 2.1 inches. The principal positive departures were Prince Albert, 1.0 inch; White River, 2.8 inches; Parry Sound, 1.4 inches; Southampton, 0.9 inch; Montreal, 1.0 inch.

In the southern portions of British Columbia, the extreme southwestern portion of the Maritime Provinces, and in the Peninsula of Ontario the ground was generally bare of snow at the close of the month, but over a large portion of the Dominion there was still a considerable cover-

ing. Cariboo reports as much as 68 inches on the lower levels and far greater depths on the mountains; Alberta, from a trace in southern localities to 9 inches in northern; Saskatchewan, from 4 to 10 inches; Manitoba, from a trace to 8 inches; the northern portions of Ontario, from 2 to 9 inches; Quebec, from 6 to over 24 inches; and the Maritime Provinces as much as 24 inches in northern districts.

Average temperatures and departures from the normal.

Districts	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	12	34.6	+ 1.5	- 6.7	- 2.2
Middle Atlantic	16	45.0	+ 4.7	+ 1.9	+ 0.6
South Atlantic	10	61.1	+ 7.2	+11.4	+ 3.8
Florida Peninsula*	8	72.0	+ 5.7	+10.6	+ 3.5
East Gulf	11	66.7	+ 9.4	+19.3	+ 6.4
West Gulf	10	66.8	+ 9.5	+22.7	+ 7.6
Ohio Valley and Tennessee	13	53.1	+ 8.8	+13.0	+ 4.3
Lower Lake	10	37.6	+ 5.3	+ 1.6	+ 0.5
Upper Lake	12	32.6	+ 5.3	+ 3.9	+ 1.3
Upper Dakota*	9	25.0	+ 5.0	- 1.5	- 0.5
Upper Mississippi Valley	13	44.0	+ 7.9	+11.8	+ 3.9
Missouri Valley	12	45.6	+ 9.6	+13.7	+ 4.6
Northern Slope	9	35.3	+ 4.5	+ 5.0	+ 1.7
Middle Slope	6	52.0	+ 9.5	+19.6	+ 6.5
Southern Slope*	7	60.4	+ 9.7	+24.3	+ 8.1
Southern Plateau*	12	50.3	+ 1.2	+11.0	+ 3.7
Middle Plateau*	10	40.8	+ 2.6	+16.2	+ 5.4
Northern Plateau*	12	38.5	+ 0.9	+ 2.0	+ 0.7
North Pacific	7	42.8	- 1.4	- 2.4	- 0.8
Middle Pacific	8	49.6	- 2.9	+ 0.2	+ 0.1
South Pacific	4	54.4	- 0.8	+ 3.6	+ 1.2

* Regular Weather Bureau and selected cooperative stations.

In Canada.—Director R. F. Stupart says :

The temperature was below the average in British Columbia and Alberta, average or slightly below in Saskatchewan, except in the extreme eastern portion, average or a little below in eastern Quebec, and below the average in the Maritime Provinces; elsewhere in the Dominion it was above the average. The chief negative departures occurred in the northern portions of British Columbia and Alberta and in Prince Edward Island and Cape Breton, and amounted to from 4° to 5°. The most marked positive departures were in Manitoba, from 4° to 5°, and the greater portion of Ontario, from 4° to 8°.

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	73	- 2	Missouri Valley	68	- 4
Middle Atlantic	70	- 2	Northern Slope	68	+ 1
South Atlantic	72	- 3	Middle Slope	56	- 4
Florida Peninsula	80	+ 3	Southern Slope	50	- 1
East Gulf	72	- 1	Southern Plateau	47	+ 8
West Gulf	74	+ 2	Middle Plateau	62	+ 5
Ohio Valley and Tennessee	69	- 2	Northern Plateau	71	+ 4
Lower Lake	77	+ 1	North Pacific	77	+ 1
Upper Lake	78	- 1	Middle Pacific	80	+ 4
Upper Dakota	81	- 3	South Pacific	74	+ 3
Upper Mississippi Valley	74	+ 1			

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	5.4	- 0.2	Missouri Valley	5.6	0.0
Middle Atlantic	5.6	+ 0.1	Northern Slope	5.2	+ 0.3
South Atlantic	4.4	- 0.3	Middle Slope	4.4	+ 0.4
Florida Peninsula	2.3	- 1.7	Southern Slope	4.4	+ 0.3
East Gulf	4.4	- 0.3	Southern Plateau	4.4	+ 0.4
West Gulf	4.8	- 0.4	Middle Plateau	4.2	+ 1.7
Ohio Valley and Tennessee	6.0	+ 0.1	Northern Plateau	4.2	+ 0.6
Lower Lake	6.9	+ 0.5	North Pacific	4.2	- 0.1
Upper Lake	6.4	+ 0.5	Middle Pacific	4.2	+ 1.5
North Dakota	5.4	- 0.1	South Pacific	4.8	+ 1.3
Upper Mississippi Valley	5.8	+ 0.3			

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Alpena, Mich.	19	50	nw.	Mount Weather, Va.	8	50	nw.
Amarillo, Tex.	25	52	se.	Do	20	66	nw.
Bismarck, N. Dak.	21	70	w.	Nantucket, Mass.	24	56	ne.
Block Island, R. I.	20	57	nw.	New York, N. Y.	20	58	nw.
Do	25	50	ne.	Northfield, Vt.	20	50	nw.
Boston, Mass.	20	52	nw.	North Head, Wash.	21	56	se.
Buffalo, N. Y.	3	72	sw.	Do	23	74	se.
Do	5	58	nw.	Do	23	64	nw.
Do	17	50	sw.	Pierre, S. Dak.	21	62	sw.
Burlington, Vt.	16	61	se.	Pittsburg, Pa.	2	54	nw.
Do	19	50	se.	Do	5	50	nw.
Canton, N. Y.	17	64	sw.	Point Reyes Light, Cal.	5	72	s.
Cape Henry, Va.	14	56	n.	Do	9	60	sw.
Cleveland, Ohio	5	68	w.	Do	11	59	nw.
Columbus, Ohio	1	52	nw.	Do	12	52	nw.
Do	2	53	w.	Do	17	57	s.
Do	5	50	w.	Do	18	55	s.
Duluth, Minn.	19	56	nw.	Do	19	54	s.
Do	26	52	ne.	Do	22	82	s.
Eastport, Maine	20	56	nw.	Do	23	84	s.
Escanaba, Mich.	19	53	nw.	Do	24	62	sw.
Galveston, Tex.	30	52	ne.	Do	27	53	nw.
Grand Rapids, Mich.	29	50	sw.	Do	31	52	nw.
Hatteras, N. C.	24	50	ne.	Portland, Maine	20	54	nw.
Do	25	54	ne.	Pueblo, Colo.	26	61	w.
Lexington, Ky.	1	57	nw.	Rapid City, S. Dak.	21	60	sw.
Marquette, Mich.	19	56	nw.	Sault Ste. Marie, Mich.	19	61	nw.
Modena, Utah	20	52	sw.	Southeast Farallon, Cal.	5	64	se.
Do	24	50	sw.	Do	22	58	s.
Do	25	50	sw.	Do	23	60	s.
Mount Tamalpais, Cal.	5	53	s.	Syracuse, N. Y.	19	62	sw.
Do	17	56	s.	Do	20	54	w.
Do	24	50	sw.	Do	24	66	s.
Mount Weather, Va.	2	56	nw.	Tatoosh Island, Wash.	23	60	s.
Do	3	62	nw.	Toledo, Ohio	5	54	w.
Do	6	62	nw.	Do	29	55	sw.